

No precipitation at all occurred from the lows originating in Manitoba and the Missouri Valley.

It appears that at times precipitation will be caused in Missouri, usually within twenty-four hours, by high areas, mostly of decided character, in the Slope or Plateau regions. The pressure is generally above the normal over the remainder of the country, although there are sometimes lows of slight intensity moving across the Gulf of Mexico, or else over the extreme north, particularly in the winter. In nearly all the cases the amounts of precipitation were light, and, except in summer, were evidently caused by condensation by the low temperatures accompanying the highs. In the summer the conditions were generally unsettled and somewhat confused, causing local showers, principally thunderstorms.

It is worthy of note that the highs rarely moved across the Mississippi River, except with greatly decreased energy. Many were dissipated west of the river, normal equilibrium evidently having been restored by the precipitation.

The following conditions usually precede precipitation from high areas:

(a) High of decided character in the northern or middle Slope or middle Plateau, and elsewhere pressure normal or above.

(b) Cold wave covering the central valleys and West except in summer.

(c) Isothermal gradients usually quite steep, about 10° per 100 miles (except in summer), either in southeast Nebraska and southwest Iowa, or in Missouri, or in western Kentucky and western Tennessee, and less than one-half as steep to the northwestward, with the isotherms extending in a northeasterly direction.

(d) Frequently in winter a low of slight intensity over the Gulf of Mexico, and sometimes over the extreme north, although these latter lows do not appear to have any effect on the result.

(e) Northeasterly winds, shifting later to easterly and southeasterly. One peculiar form of high pressure area, with conditions somewhat different from the above, caused precipitation in Missouri in about 83 per cent of the cases investigated. The pressure was generally high over the whole country east of the Rocky Mountains, but the belt of highest pressure extended in oval form over the States immediately north of Missouri, sometimes reaching farther west to Nebraska and as far east as West Virginia, but with the highest belt extending from eastern Nebraska to western Illinois. The weather was cloudy, with northerly winds, and the temperatures ranged from 30° to 40° within the State of Missouri,

although much lower in one case. The isotherms extended across the State in a horizontal direction parallel to the long axes of the oval isobars above mentioned. Precipitation from high areas always followed in twenty-four hours and was usually light in amount.

#### TEMPERATURE.

The following general conclusions were deduced from a study of the origin and progress of cold waves:

I.—The severity of the cold wave depends largely upon the lowest reading of the barometer, the proximity of the center of the low to the State, its position with reference to the State, and the intensity of the succeeding high.

II.—Owing to the latitude of Missouri and the rapid easterly movement of the lows from November to April inclusive, nearly all the cold waves are of comparatively short duration.

III.—“The most marked cold waves occur with a low in Missouri and a high in Montana or North Dakota.” (Hammon.)

IV.—When a low passes to the southeast west of Missouri there will be no marked fall in temperature, as the winds will blow from some northerly direction in advance of the low, and there will not be much rise in temperature. In cases of this sort it is perhaps better to forecast colder in twenty-four hours, followed by warmer within twelve hours after that, as the high following the low will cause warmer southerly winds without regard to the intensity of the former, and the extent of the cold wave in the West and Northwest.

V.—“A low in Missouri and a high in Minnesota affect eastern Missouri, but not materially western Missouri.” (Hammon.)

VI.—A Mexican low passing through Missouri produces a severe cold wave lasting at least from thirty-six to forty-eight hours.

VII.—A low in Colorado moving rapidly eastward, e. g., to the upper Lakes in twenty-four hours, causes a decided cold wave of short duration in about thirty-six hours. A considerable rise in temperature may be expected within thirty-six hours after, unless the high is reinforced by another coming down from the extreme north, in which case the low temperature will persist for a day or two longer.

VIII.—When a low moves across the extreme north the fall in temperature in Missouri will not be very great, but if the temperature is already comparatively high, the fall is likely to be sufficient to justify a cold wave warning. These cold waves are in all cases of very short duration.

### NOTES BY THE EDITOR.

#### THE VALUE OF WEATHER BUREAU FORECASTS.

With respect to the value of the Weather Bureau forecasts Dr. Isaac M. Cline writes in the Monthly Bulletin of the Texas Weather Service for August, as follows:

A West Indian hurricane touched the Texas coast country on August 29, when gales were reported from Port Lavaca westward to Brownsville, extending into the interior as far north as Rio Grande City, where much damage was done by the wind. Boats in port were damaged to some extent at Brownsville and Corpus Christi, and several houses were blown down at Rio Grande City and Brownsville. Forecasts showing the location of this storm were received from the chief office at Washington for three or four days before the storm reached the coast. These forecasts were given wide distribution and everybody kept well informed in regard to the progress of the storm. It is reported from Brownsville that had not these warnings been given much damage would have been done, which was avoided by the timely preparations. This was the case generally all along the coast, as the warnings caused many vessels to remain in port until all danger was over.

High tides were reported from all along the coast and the sea swells at Galveston, Tex., at 8 a. m. on the 29th were the highest which have occurred since July 5, 1891. There was no material damage done at this place, except there was slight erosion on the beach and some jetty piling washed off. The exact damage done by this storm along the west gulf is not definitely known.

#### THE GREAT DROUGHT OF 1845 IN NORTHERN OHIO.

This drought is described by Mr. Seabury Ford in a letter to S. P. Hildreth, as published in the American Journal of Science, March, 1846, (2), Vol. I, p. 207, as follows:

The district of country which suffered the most was about 100 miles in length, and 50 or 60 in width, extending nearly east and west parallel with Lake Erie, and in some places directly bordering on the shore of this great inland sea. There was no rain from the last of March or the first of April until the 10th of June, when there fell a little rain for one day, but no more until the 2d of July, when there probably fell half an inch, as it made the roads a little muddy. From